

SOLAR OBSERVATIONS

SOLAR AND SKY RADIATION MEASUREMENTS DURING JANUARY, 1927

By HERBERT H. KIMBALL, Solar Radiation Investigations

For a description of instruments and exposures and an account of the method of obtaining and reducing measurements the reader is referred to the REVIEW for January, 1924, 52: 42, January, 1925, 53: 39, and July, 1925, 53: 318.

Commencing with this month, weekly summaries are given in Table 2 of the total radiation received on a horizontal surface from the sun and sky at the Bureau of Entomology station, Twin Falls, Idaho, latitude 42° 29' N., longitude 114° 25' W., altitude 1,300 meters. The measurements are obtained by the use of a Weather Bureau recording thermoelectric pyrheliometer under the supervision of the Bureau of Entomology.

From Table 1 it is seen that solar radiation intensities averaged slightly below normal at all three stations. At Washington, D. C., at noon of the 27th, however, a measured intensity of 1.45 gr. cal. per minute per cm² exceeds the previous noon maximum for January by about 1 per cent.

TABLE 1.—Solar radiation intensities during January, 1927

[Gram-calories per minute per square centimeter of normal surface]

Washington, D. C.

Date	Sun's zenith distance										Noon	
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°		
	75th mer. time	Air mass										Local mean solar time
		A. M.					P. M.					
		e.	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0		
Jan. 6	<i>mm.</i>	<i>cal.</i>	<i>cal.</i>	<i>cal.</i>	<i>cal.</i>	<i>cal.</i>	<i>cal.</i>	<i>cal.</i>	<i>cal.</i>	<i>cal.</i>	<i>mm.</i>	
11	2.74	0.87	0.98	1.18	1.35	1.54	1.45	0.85	0.62		2.62	
12	1.60	0.64	0.82	1.03	1.22	1.45					1.45	
25	1.78	0.37	0.47	0.69	0.99						1.88	
27	3.30	0.64	0.78	0.99	1.21		1.25	1.02	0.86	0.76	3.15	
31	0.81		1.07	1.20	1.42	1.62	1.31				1.12	
Means	3.81		1.02								3.99	
Departures		0.63	0.86	1.02	1.24	1.54	(1.30)	(0.94)	(0.74)	(0.76)		
		-0.10	+0.02	+0.02	+0.01		+0.07	-0.09	-0.13	-0.02		

Madison, Wis.

Jan. 5.....	3.15	0.99									3.30
6.....	1.88							1.26			2.06
14.....	0.81							1.28			0.74
20.....	0.81	0.86	0.96	1.09				1.00			1.19
24.....	1.68	0.93	1.05	1.20							2.06
25.....	1.78	0.79	0.91	1.07	1.21						1.68
26.....	0.41	1.03	1.15	1.26							0.74
30.....	2.49				1.41						2.16
31.....	1.88	0.89									2.16
Means.....		0.92	1.02	1.16	(1.31)			1.18			
Departures.....		-0.04	-0.06	-0.07	-0.04			-0.04			

Lincoln, Nebr.

Jan. 4.....	3.15		1.17	1.28		1.48		1.25	1.17	1.06	4.17
5.....	3.45	0.90	1.00					1.25	1.04	0.93	4.57
6.....	3.45	0.84	0.95	1.10				1.15			3.99
8.....	3.81	0.84	1.09	1.25				1.19	1.08	0.94	4.17
10.....	2.06	1.05	1.16	1.24							2.62
13.....	1.52							1.25	1.11	1.04	1.32
14.....	1.32	1.07	1.19	1.33	1.49	1.68		1.34	1.22	1.12	0.79
23.....	1.60							0.98	0.88	0.79	2.16
26.....	0.81			1.06	1.30						1.45
28.....	3.15			0.93	1.25		1.16				3.81
29.....	4.37				1.34						3.99
31.....	2.49		1.00	1.11							3.00
Means.....		0.94	1.08	1.16	1.34	(1.58)	(1.16)	1.19	1.08	0.98	
Departures.....		+0.01	+0.04	-0.01	-0.03		-0.11	+0.03	+0.04	+0.06	

* Extrapolated.

Table 2 shows a deficiency in the total solar radiation received on a horizontal surface from the sun and sky at the three stations for which normals have been determined.

No skylight polarization observations were obtained at Madison, Wis., as the ground was covered with snow throughout the month. At Washington, measurements made on three days give a mean of 63 per cent with a maximum of 65 per cent on the 12th. These are slightly above the corresponding averages for January at Washington.

TABLE 2.—Solar and sky radiation received on a horizontal surface
[Gram-calories per square centimeter of horizontal surface]

Week beginning—	Average daily radiation						Average daily departure from normal		
	Washington	Madison	Lincoln	Chicago	New York	Twin Falls	Washington	Madison	Lincoln
Jan. 1.....	Cal. 128	Cal. 129	Cal. 179	Cal. 56	Cal. 122	Cal. 182	Cal. -22	Cal. -8	Cal. -4
8.....	146	123	224	50	126	168	-9	-27	+28
15.....	124	128	149	75	73	316	-37	-36	-55
22.....	150	194	178	92	128	199	-30	+7	-42
Deficiency since first of year on Jan. 28.....							-686	-448	-511

PHOTOHELIOGRAPHIC OBSERVATIONS, 1927

Beginning with this issue of the REVIEW we plan to publish each month data similar to that given in the table below. This is the outgrowth of a request by the U. S. Naval Observatory that the Weather Bureau aid in expediting the publication of such data obtained by the observatory. The original suggestion has, at the instance of the Weather Bureau, been extended so that data from several widely scattered points will be included, thereby assuring that we shall obtain observations for as many days as possible each month, regardless of sky conditions at any one station. The following observatories are cooperating: U. S. Naval, Yerkes, Mount Wilson, and Harvard College. The Naval Observatory has undertaken to compile the data.

We expect to print in our February issue, in connection with the table, notes describing the methods of photographing the sun spots and of computing their areas.

Positions and areas of sun spots

[Communicated by Capt. Edwin T. Pollock, superintendent U. S. Naval Observatory]

Data from Naval Observatory and Harvard and Yerkes Observatories¹

Date	Eastern standard civil time	Heliographic		Area ¹	
		Longi- tude	Lat- itude	Spot	Group
1927	<i>Hr. min.</i>	°	°		
Jan. 2 (N. O.)	11 48	-88. 0	-12. 0		309
		-53. 5	+20. 0	62	
		-17. 0	+10. 0	62	
		-8. 0	+10. 5		247
		+20. 5	-8. 0		401
Jan. 3 (H.)	11 55	-66	-12	149	
		-57	-10		278
		-37	+20	41	
		+6	+11		159
		+28	-5	834	
		+50	-18	21	

¹ The letters N. O. in the first column signify that the photograph was taken at the U. S. Naval Observatory; the letters Y. and H. that it was taken at Yerkes Observatory and Harvard Observatory respectively.

² The areas are expressed in millionths of the sun's visible hemisphere. The longitudes east of the central meridian are written as minus, and west of it as plus. The north latitudes are plus and the south minus.